Have Supermarket Mergers Raised Prices?*
An Event Study Analysis

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Abstract

Antitrust enforcement of supermarket merger activity during the late 1980s and early 1990s was less stringent than it had been before or has been since. For six announcements of supermarket acquisitions during this period, this study examines the abnormal stock returns of rival firms to determine if investors believed these acquisitions would lead to higher retail prices. These abnormal returns imply that the average retail price change associated with these types of acquisitions ranges from a 0.1 percent decrease to a 0.05 percent increase. Thus, our results suggest that investors generally did not view these acquisitions as anticompetitive.

I. Introduction

Antitrust enforcement of retailing mergers has varied dramatically over the past several decades. In 1966, the Supreme Court blocked a merger between Von's Grocery and Shopping Bag Food Stores that would have given the merged firm a 7.5 percent share of the grocery retailing business in Los Angeles.[1] In contrast, in 1989, a district court denied the Federal Trade Commission a preliminary injunction barring the acquisition by Red Food Stores of seven Kroger Company stores.[2] Although the acquisition gave Red Food Stores a 67 percent share of the Chattanooga, Tennessee supermarket chain market, the district court found that entry by other supermarket chains would quickly restore competition if supermarket prices increased.

These examples reflect two polar views about the likely effect of retailing mergers. The first view holds that retailing mergers often harm consumers because particular retailing formats (e.g., supermarkets) provide consumers with a unique service that they cannot easily obtain elsewhere, and retailers with other formats cannot easily reposition their stores. Within a particular format, this first view then holds that mergers reduce localized competition or facilitate collusion, and entry by new stores or expansion of existing stores will be too slow to restore competition. The second view, in contrast, holds that retailing mergers are rarely anticompetitive because consumers either will readily shift their purchases among retailing formats or entry by new stores or expansion of existing stores will quickly restore competitive pricing.

Previous empirical work provides only limited guidance in choosing between these two views. Several studies (e.g., Cotterill, and Marion) have examined the relationship between price and concentration across geographic areas and have found that supermarket prices tend to be higher in more concentrated areas. Since mergers increase concentration, the results of these studies are consistent with the view that some retailing mergers can lead to higher prices. These results, however, do not indicate whether all mergers or only those that increase concentration above some critical level are problematic. Our study seeks to supplement these earlier studies by testing to see whether there is such a critical level. Specifically, our study uses the event study methodology to analyze the competitive effects of six supermarket mergers that occurred in the late 1980s and early 1990s, a period of relatively relaxed merger enforcement.

The event study methodology is based on the premise that capital markets are efficient in the sense that stock prices reflect future profitability. Consequently, if a merger is expected to lead to higher product prices, then investors should bid up the price of rival firms' stock in anticipation of higher profits in the affected market. Thus, we potentially can identify those supermarket mergers that investors believed would lead to higher retail prices by examining changes in the share price of rival firms following the announcement of a merger. One complication to this interpretation is that a merger may signal other information. For instance, the share price of rival firms might also increase if a merger signals opportunities for these rival firms to obtain benefits through their own mergers. In this study, however, we use the stock returns of supermarkets in geographic

markets unaffected by the merger to control for any signaling effect of the merger. In this respect, our study is similar to Winston and Collins' study of entry into airline markets, Chevalier's study of leveraged buyouts among supermarket chains, and Bosch, Eckard, and Singal's study of air crashes.

For the six supermarket mergers in our sample, we use this event study methodology to estimate the confidence intervals for the abnormal returns of rival firms. These confidence intervals suggest that investors expected these mergers, on average, would have very little effect on supermarket prices. We describe the event study methodology in section two and the data in section three. We present our results in section four. Section five concludes.

II. Event Study Methodology

The event study methodology assumes that stock markets swiftly capitalize new information in valuing a firm's stock. Given this, if a merger is expected to lead to higher product prices, then investors should quickly bid up the price of rival firms' stock in anticipation of higher profits in the affected market. Thus, in principle, we can use changes in the share price of rival firms to identify anticompetitive mergers. In practice, however, two issues complicate such an inference.

First, the stock price of rival firms could rise following the announcement of a merger because the merger revealed previously unknown opportunities for them to obtain efficiencies through merger. In this study, we can largely control for this effect since many

supermarkets serve only local or regional markets. If a supermarket merger signals that retailers in any geographic region can gain efficiencies through mergers, then all supermarkets with stores of a similar format regardless of their location should see their share price increase. Thus, we can use the share price response of supermarkets in markets unaffected by a merger to control for any nationwide efficiency-signaling effect of a merger.[3]

Second, for several reasons, we also might fail to see the stock price of rival firms increase even if a merger is anticompetitive. McAfee and Williams note that rival firms are unlikely to have measurable positive abnormal returns when an anticompetitive merger is announced if they receive only a small amount of their total revenue from markets affected by the merger. This is not an issue in our study since the rival firms in our data set derive a significant share of their revenue from areas affected by the merger. We would also fail to see the stock price rise if we fail to identify the correct event date. Studies by Eckbo and Stillman use the abnormal returns of the target firm to identify the exact date when information about an acquisition reached the stock market. While we are able to do this in two of the acquisitions that we examine, we are unable to do this in the other acquisitions because the target firm was not publicly traded in the United States. For these mergers, we are forced to assume that the information reached the market either the day before or the day the Wall Street Journal (WSJ) reported the acquisition. Since Dodd found that target firms realize large, significantly positive abnormal returns on the day of and day

prior to merger announcements, these dates appear to be the dates when new information about a merger reach the market.

In conclusion, if we correctly identify the event dates and the rival firms and control for observationally equivalent explanations for increases in a rival firm's stock price, we can use the event study methodology to analyze the competitive effects of mergers.[4] In fact, as Eckbo notes, the event study methodology is superior to a comparison of pre-merger and post-merger prices in two respects. First, the event study methodology captures the merger's effect on all dimensions of competition, not just the price dimension. Second, because the stock market responds to new information over a very narrow time period, the event study methodology can isolate a merger's effect on product prices. Because a comparison of pre-merger and post-merger prices will likely span a longer time period, factors unrelated to the merger may confound this comparison.[5]

III. Data and Sample

We use The Merger Yearbook to identify large transactions in the retailing sector. In order to examine those mergers that would have been most likely to reduce competition, we draw our sample from the set of transactions that occurred from 1984 through 1995. In 1983, the Federal Trade Commission (FTC) dismissed its complaint against the Grand Union Company. In dismissing its complaint, the FTC found that the product market included all grocery stores and concluded that entry barriers were relatively low at least in much of the Southeastern United States. We believe that this

decision signaled a less restrictive period of antitrust enforcement of retailing mergers. Conversely, during the mid-1990s, antitrust enforcement of retailing mergers appears to have become more stringent. In 1996, a threat of an antitrust challenge prompted two drug store chains, Rite Aid and Revco, to abandon their proposed merger. In 1997, the FTC obtained a preliminary injunction against the proposed merger of two chains of office supply stores, Staples and Office Depot, which prompted those two firms to abandon their merger. Finally, in 1999, the FTC obtained its largest retail divestiture ever when it forced Albertsons to divest 144 stores. The year 1995 is chosen to predate this shift in enforcement.

Of the remaining transactions, we eliminate all leveraged buyouts and all transactions in which there was not a significant geographic market overlap. This leaves sixteen transactions. To conduct event studies for these transactions, we must first identify the geographic overlaps between the two merging firms and then identify a publicly traded competitor that obtained a significant share of its revenue from the overlap area. To do this, we use the SN Distribution Study of Grocery Store Sales. We also use this source to compute market concentration figures. We dropped ten transactions because no publicly traded competitor obtained a significant share of its revenue from the overlap area. This left the six mergers analyzed in this study

We used the Center for Research in Security Prices (CRSP) NYSE database to obtain stock return data. For several rival firms listed on the NASDAQ and American stock exchanges, we supplemented this database with stock returns from Standard &

Poor's Daily Stock Price Record. We used the Wall Street Journal Index to identify the announcement date of a particular transaction. We also checked the Wall Street Journal Index to see whether any additional information (e.g., an earnings announcement) might have affected a rival's share price on the event dates that we examine. Deleting the few cases where the Wall Street Journal (WSJ) reported such information does not change our results.

V. Results

We use the event study methodology to perform two tests. The first looks at the abnormal returns of each rival supermarket in each of the six mergers. While this test enables us to focus on the competitive effects of individual mergers, this test produces weak statistical results. The second test looks at the relationship between a supermarket's abnormal return when a merger is announced and the extent to which it has operations in areas affected by that merger. This test enables us to use a bigger sample to draw more powerful statistical results about the average effect of the mergers that we examine on competition.

In our first test, we compute the abnormal returns to rival firms using a modified version of the market model used by Eckbo, Stillman, and others.

$$(1) \qquad R_{it} \quad \alpha_i \ \beta_i R_{mt} \ \gamma_i R_{rt} \ \delta_{it} D_{it} \ e_{it}$$

where:

R_{it} is the daily rate of return to firm i;

R_{mt} is the daily value-weighted return for stocks on the New York Stock Exchange;

R_{rt} is the daily rate of return for an equal value weighted supermarket index comprised of firms with operations in geographic markets unaffected by the merger.[6] R_{rt} should largely control for any general signaling effect of a merger. This signal could be that other firms could gain efficiencies through mergers or that additional mergers would reduce competition in other markets. To the extent that R_{rt} captures the latter, the coefficient for D_{it} will understate the competitive harm from the merger.

D_{it} is a dummy variable with a value of 1 if an event occurs on day t; and

e_t is a serially uncorrelated random disturbance.

We estimate equation (1) using data from the interval beginning two hundred trading days before the event date and ending ten trading days after the event date.

Table 1 lists our results. The first column lists the acquisition, the affected geographic areas, and the date the WSJ reported the acquisition. The second column lists the rival firms. Column three, which lists the rival firm's abnormal returns on the day before the merger was reported, accounts for the possibility that the merger was announced after the WSJ had gone to press for that day. Column four lists the abnormal return on the date the WSJ reported the acquisition. As noted earlier, the target firm was publicly-traded in two acquisitions, A&P/Waldbaum and Lucky/American Stores. Thus, we have used the target firm's abnormal return in these two mergers to determine the exact date when new information reached the market. The fifth column indicates the

percentage of the rival's stores that operated in the affected geographic areas.[7] Columns six, seven, and eight describe the merger's effect on market structure for the rival's stores in the overlap areas. Specifically, column six reports the change in the Herfindahl-Hirschman Index (HHI),[8] column seven reports the post-merger HHI, and column eight describes the action taken by antitrust enforcement agencies.

Columns three and four list the abnormal returns and associated standard errors for the possible event dates for all six mergers. In four mergers, the rivals' abnormal returns do not suggest that the merger was anticompetitive. In A&P's acquisition of Waldbaum, the rival's abnormal return is negative and statistically insignificant. In both Vons' acquisition of Safeway's Southern California stores and Food4Less's acquisition of Ralphs, some rivals realized positive abnormal returns, and some rivals realized negative abnormal returns. None of these returns are statistically significant. In Schwegmann's acquisition of National Tea's New Orleans stores, the rival realized a small and statistically insignificant abnormal return on both possible event dates.

In two mergers, the rivals' abnormal returns are positive and large. In American Stores' acquisition of Lucky Stores, Albertsons realized an abnormal return of 2.8 percent, and Craig Corporation realized an abnormal return of 2.7 percent. In A&P's acquisition of Big Star, Ingles Markets realized a positive return of 3.9 percent on the day before the WSJ reported the acquisition. Although these abnormal returns are roughly consistent with a 1 percent retail price increase lasting a year or two,[9] they are not statistically

significant at standard levels. Thus, we cannot make any strong inference about the competitive effects of these mergers.

In our second test, we examine the relationship between a supermarket's abnormal return on the date that information about a merger reached the market and the degree to which it has operations in areas affected by that merger. To do this, we construct a data set that relates a supermarket's abnormal return to a measure of the geographic overlap between a supermarket and the merging firms. Specifically, for each merger listed in Table 1, there is a corresponding list of publicly-traded supermarket chains. For each of these supermarket chains, we estimate equation 2 using data from the interval beginning two hundred trading days before the event date and ending ten trading days after event date in order to obtain the chain's abnormal return at the time of the merger (the coefficient $\delta_{i,t}$).

$$(2) \qquad R_{it} \quad \alpha_i \ \beta_i R_{mt} \ \delta_{it} D_{it} \ e_{it}$$

For each of these supermarket chains, we also calculate the "overlap", which we define as the proportion of a supermarket's operations located in areas affected by the merger.[10] An observation is then the abnormal return for one of these chains and the corresponding overlap at the time of a merger. The data set then combines these observations for the six mergers listed in Table 1.

Using this data set, we estimate the following weighted least squares model, where the dependent variable is a chain's abnormal return and the weights are the inverse of the estimated variance of $\delta_{i,t}$ from equation 2.

$$(3) \quad AR_{it} = \alpha\, OVERLAP + \beta_1 APSTAR + \beta_2 APWALDBAUM + \beta_3 FOOD4LESS + \beta_4 LUCKY + \beta_5 SCHWEGMANN + \beta_6 VONSAFE + \varepsilon$$

In this model, OVERLAP is the proportion of a supermarket chain's operations located in areas affected by a merger. Thus, the coefficient for OVERLAP measures the difference in abnormal return between a firm with all of its operations in areas affected by the merger and a firm with none of its operations in these areas. OVERLAP will be positive if investors believe that the mergers we examine will reduce competition in the geographic areas affected by the merger. OVERLAP will be negative if investors believe that the mergers we examine will increase competition by making the two merging firms more efficient.

This model assumes that each of the mergers would lead to the same increase in retail prices in overlap areas. Given the mergers that we observe, we believe that this assumption is reasonable. With one exception, the rivals experience a 200 to 300 point increase in the HHI in the overlap area. Deleting the observations associated with this exception does not substantially affect the results. With two exceptions, the post-merger

HHI in the overlap areas ranged between 1800 and 2600. Again, deleting the observations associated with these exceptions does not substantially affect the results.

As noted earlier, we ideally would like to use the abnormal return of the target firm to identify the exact date when information about an acquisition reached the stock market. While we could do this in two acquisitions, A&P's acquisition of Waldbaum and American Stores' acquisition of Lucky, we were unable to do this in the other four acquisitions because the target firm was not publicly traded in the United States. For these four acquisitions, we believe that information about the acquisition reached the stock market either the day before or the day the WSJ reported the acquisition. Thus, for these four acquisitions, we have sixteen possible combinations of event dates (e.g., one set of event dates would be the date of the WSJ article for all four acquisitions, another set of event dates would be the date prior to the WSJ article for all four acquisitions). We estimate equation 3 for each of these sixteen combinations of possible event dates.

For these 16 regressions, Table 2 lists the highest and lowest estimated coefficients for OVERLAP,[11] which measures the difference in the abnormal return between a supermarket chain with all of its stores in areas affected by the merger and a supermarket chain with none of its stores in these areas. The estimated coefficients range between -0.35 percent and -2.2 percent. Table 3 lists the boundaries of the 95 percent confidence interval for the estimated coefficients for OVERLAP. The lowest lower bound is -4.8 percent. Assuming that supermarket profits are 2 percent of revenue, this abnormal return roughly corresponds to a permanent 0.1 percent decrease in retail prices.[12] The highest

upper bound is 2.4 percent. Again, assuming supermarket profits are 2 percent of revenues, this abnormal return roughly corresponds to a permanent 0.05 percent increase in retail prices. Thus, on average, mergers similar to those in our sample appear to lead to very small retail price changes.

In this model, the last six explanatory variables are dummy variables for each acquisition. Since the coefficients for these variables measure the effect each announcement had on supermarket stock prices generally, a positive sign would indicate that the merger signaled good news to supermarket firms. This good news could be that other firms can gain efficiencies through similar mergers; this good news could also be that a wave of anticompetitive mergers is likely to lead to higher prices in many markets.

For each possible merger event date, table 2 lists the highest and lowest estimated abnormal return and the corresponding standard error. With two possible exceptions, the estimated abnormal returns for these event dates do not suggest that the acquisitions signaled good news for supermarkets generally. The first exception is American Store's acquisition of Lucky. When news of this acquisition reached the market, supermarket chains realized a statistically significant abnormal return of roughly 1.7 percent. This acquisition, because of its size and high post-merger HHI, may have signaled new information to the market. Without considering other evidence, however, we cannot tell whether this good news represented a belief that other firms could gain efficiencies through mergers or that a wave of anticompetitive mergers would lead to higher prices in other markets.

The second exception is A&P's acquisition of Big Star. In this acquisition, other supermarket chains realized a large, negative, and statistically significant abnormal return on the day before the merger was reported and a large, positive, and statistically significant abnormal return on the day the merger was reported. Despite these results, we do not think that this acquisition generally signaled good or bad news to supermarket chains. Since the acquisition was comparatively small and was unlikely to trigger an antitrust challenge given the FTC's behavior in the recent past, the acquisition seemingly would not have provided new information to the market about whether other supermarkets could gain efficiencies through mergers or whether a wave of anticompetitive mergers could lead to higher prices in other markets.

VI Conclusion

In the late 1980s and early 1990s, the antitrust agencies basically did not challenge supermarket mergers leading to post-merger HHIs between 1800 and 2400, provided the parties were willing to divest stores in localized areas where the post-merger HHI would have been higher. For six announcements of supermarket acquisitions during this period, this study examines the abnormal stock returns of rival firms in order to determine whether investors believed these acquisitions would lead to higher retail prices. These abnormal returns imply that the average price change associated with these types of acquisitions ranges from a very small price decrease to a very small price increase. Thus, our results suggest that investors generally did not view these acquisitions as anticompetitive.

While these results suggest that acquisitions or mergers of this type generally do not lead to significantly higher retail prices, we can not rule out the possibility that one or two of these acquisitions might have been anticompetitive. For instance, the large positive abnormal returns of the two rival firms in American Store's acquisition of Lucky Stores is consistent with an anticompetitive effect for that acquisition. Finally, our results also should not be interpreted as suggesting that supermarket mergers leading to higher post-merger HHIs do not harm consumers since our sample did not include any markets where a merger led to a very high post-merger level of concentration after divestitures had been taken into account.

TABLE 1
ABNORMAL RETURNS OF RIVAL FIRMS

MERGER	RIVAL FIRM	ABNORMAL RETURN (day prior to announcement)	ABNORMAL RETURN (day of announcement)	PERCENT OVERLAP	CHANGE IN HHI	POST-MERGER HHI	ACTION BY ANTITRUST AGENCY
A&P/Waldbaum (New York City, LI) November 28, 1986	Supermarket General (Pathmark)	—	-0.019 (0.017)	54	266	1348	no divestitures were required
Vons/Safeway (Southern California, Las Vegas) December 4, 1987	Albertsons	-0.023 (0.018)	0.021 (0.019)	23	312	1854	The FTC required Vons to divest 12 of the 172 stores that it acquired.
	Lucky	0.018 (0.018)	0.018 (0.018)	30	374	1976	The California State A.G. required Vons to divest several additional stores
	American Stores (Alpha Beta)	0.0002 (0.016)	-0.0064 (0.016)	11	335	1929	
	Federated Dept. Stores (Ralphs)	-0.024 (0.022)	-0.016 (0.022)	20	346	1803	
	Craig Corporation (Stater Brothers)	0.015 (0.033)	-0.016 (0.033)	50	304	2501	
Lucky/AmericanStores (California, Illinois, Indiana) March 23, 1988	Albertsons	0.028 (0.019)	---	26	361	2324	The California A.G. successfully blocked the transaction.
	Craig Corporation (Stater Brothers)	0.027 (0.032)	---	50	275	2594	

MERGER	RIVAL FIRM	ABNORMAL RETURN (day prior to announcement)	ABNORMAL RETURN (day of announcement)	PERCENT OVERLAP	CHANGE IN HHI	POST-MERGER HHI	ACTION BY ANTITRUST AGENCY
A&P/Big Star (Atlanta) February 8, 1993	Ingles Markets	0.039 (0.029)	-0.018 (0.029)	23	188	2303	no divestitures were required
Food4Less/Ralphs (Southern California) August 12, 1994	Albertsons	0.010 (0.014)	0.0008 (0.014)	12	317	2074	California A.G required Food4Less to divest 27 of the 165 stores that it acquired.
	American Stores (Lucky)	-0.0001 (0.014)	-0.009 (0.014)	12	303	2139	
	Vons	0.0014 (0.016)	-0.0044 (0.016)	75	313	2164	
	Smith Foods	0.014 (0.018)	-0.014 (0.018)	22	313	2089	
	Craig Corporation (Stater Brothers)	-0.0032 (0.014)	-0.017 (0.014)	50	253	1843	
Schwegmann Giant/National Tea (New Orleans) January 17, 1995	Delchamps	0.00037 (0.017)	0.0085 (0.017)	14	928	3007	The FTC required Schwegmann to divest 7 of the 17 New Orleans stores that it acquired

standard errors in parentheses

TABLE 2
RELATIONSHIP BETWEEN A SUPERMARKET'S ABNORMAL RETURN AND THE PROPORTION OF ITS OPERATIONS LOCATED IN AREAS AFFECTED BY THE MERGER
(HIGHEST AND LOWEST ESTIMATED COEFFICIENTS FOR 16 REGRESSIONS)

VARIABLE	LOWEST ESTIMATE	HIGHEST ESTIMATE
Overlap: proportion of supermarket's operations in areas affected by merger.	-0.022* (0.012)	-0.0035 (0.014)
A&P/Waldbaum: day of announcement	0.23 (0.41)	0.30 (0.38)
Vons/Safeway: day prior to announcement	0.34 (0.48)	0.47 (0.47)
Vons/Safeway: day of announcement	0.18 (0.51)	0.30 (0.48)
American Stores/Lucky: day prior to announcement	1.65*** (0.59)	1.74*** (0.55)
A&P/Big Star: day prior to announcement	-0.86** (0.40)	-0.84** (0.41)
A&P/Big Star: day of announcement	0.80** (0.35)	0.83** (0.38)
Food4Less/Ralphs: day prior to announcement	0.32 (0.36)	0.37 (0.33)
Food4Less/Ralphs: day of announcement	0.27 (0.37)	0.31 (0.34)
Schwegmann/National: day prior to announcement	-0.90** (0.36)	-0.88** (0.34)
Schwegmann/National: day of announcement	0.44 (0.34)	0.45 (0.35)

standard errors in parentheses
*** 1 percent significance level
** 5 percent significance level
* 10 percent significance level

TABLE 3
95 PERCENT CONFIDENCE INTERVALS FOR THE COEFFICIENT FOR OVERLAP
FOR EACH OF THE 16 REGRESSIONS

EVENT DATES[a]	ESTIMATE	STANDARD ERROR	OBS.	LOWER BOUND	UPPER BOUND
$M1_{-1}$ $M2_{-1}$ $M3_{-1}$ $M4_{-1}$	-0.0037	0.0128	78	-0.0292	0.0219
$M1_{-1}$ $M2_{-1}$ $M3_{0}$ $M4_{-1}$	-0.0176	0.0133	78	-0.0441	0.0090
$M1_{-1}$ $M2_{-1}$ $M3_{-1}$ $M4_{0}$	-0.0045	0.0133	78	-0.0311	0.0220
$M1_{-1}$ $M2_{-1}$ $M3_{0}$ $M4_{0}$	-0.018	0.0138	78	-0.0459	0.0090
$M1_{-1}$ $M2_{0}$ $M3_{-1}$ $M4_{-1}$	-0.0075	0.0114	78	-0.0301	0.0152
$M1_{-1}$ $M2_{0}$ $M3_{0}$ $M4_{-1}$	-0.0214	0.0119	78	-0.0451	0.0022
$M1_{-1}$ $M2_{-1}$ $M3_{0}$ $M4_{0}$	-0.0084	0.0119	78	-0.0321	0.0154
$M1_{-1}$ $M2_{0}$ $M3_{0}$ $M4_{0}$	-0.0223	0.0124	78	-0.0470	0.0024
$M1_{0}$ $M2_{-1}$ $M3_{-1}$ $M4_{-1}$	-0.0035	0.0138	78	-0.0310	0.0239
$M1_{0}$ $M2_{-1}$ $M3_{0}$ $M4_{-1}$	-0.0174	0.0143	78	-0.0458	0.0110
$M1_{0}$ $M2_{-1}$ $M3_{-1}$ $M4_{0}$	-0.0044	0.0143	78	-0.0328	0.0240
$M1_{0}$ $M2_{-1}$ $M3_{0}$ $M4_{0}$	-0.0183	0.0147	78	-0.0476	0.0110
$M1_{0}$ $M2_{0}$ $M3_{-1}$ $M4_{-1}$	-0.0074	0.0125	78	-0.0322	0.0175

$M1_0$ $M2_0$ $M3_0$ $M4_{-1}$	-0.0213	0.0129	78	-0.0470	0.0045

[a] Let M1 be the Vons/Safeway merger, M2 be A&P/Big Star merger, M3 be the Food4Less/Ralphs merger, and M4 be the Schwegmann/National merger. A subscript of -1 (0) implies the event date is the day preceding (of) the announcement of the merger in the Wall Street Journal. For example, $M1_{-1}$ $M2_{-1}$ $M3_{-1}$ $M4_{-1}$ implies that all the event dates were defined to be the day preceding the announcement of the merger in the Wall Street Journal.

Appendix

Using regional price indices to measure the competitive effects of retail mergers is difficult for a number of reasons. First, the geographic markets in which mergers take place do not necessarily correspond to the areas where regional price indices are calculated. For example, the Bureau of Labor Statistics (BLS) calculates regional price indices for a number of Metropolitan Statistical Areas (MSAs) throughout the U.S., which may be larger, smaller, or just different than the areas in which grocery store mergers affect competition. If the areas in which regional price indices are calculated do not closely correspond to antitrust markets, then these price indices may do a poor job of measuring the price effects of the merger. Second, a comparison of pre-merger and post-merger prices ignores any changes in quality such as longer or shorter hours of operation. Third, since a comparison of pre-merger and post-merger prices generally spans at least several months, factors unrelated to the merger can confound the comparison. Fourth, Pesendorfer finds that supermarkets compete through the frequency of sales. Pesendorfer also finds that consumers purchase much larger quantities of goods at sale prices than at regular prices. Since price indices are not weighted to reflect the higher volume of sales at sale prices, a merger that led to the elimination of sales would seem to have little effect on price while, in fact, having a large effect on the price that most consumers pay. Despite these shortcomings, for those readers who are interested, we have estimated how regional price indices changed following the five supermarket acquisitions that were consummated.

The price index we use is the Bureau of Labor Statistics's (BLS) "food at home index." This index is calculated semiannually for New York (A&P/Waldbaum merger), Los Angeles (Vons/Safeway and Food4Less/Ralphs mergers), and Atlanta (A&P/Big Star merger) and annually for New Orleans (Schwegmann/National Tea merger). We use this index to proxy for the price of consumer food products purchased at local retailers. The BLS normalizes this food at home index to 100 for the period 1982 to 1984 for each of twenty-eight metropolitan areas. Hence, a comparison of the level of the indices across regions at a point in time is not meaningful. However, by comparing the change in the level of the indices over time, it is possible to make meaningful comparisons across regions. The change in the relative price of food at home is calculated in the following manner. First, the percent change in the food price index following a merger for region r and the U.S. is calculated.

$$\Delta P_r \frac{P_{r,t\ 1} P_{r,t}}{P_{r,t}} 100 \ , \ \Delta P_{US} \frac{P_{US,t\ 1} P_{US,t}}{P_{US,t}} 100$$

Then the relative percentage change in the food price in region r is defined to be the difference between the percentage change in food prices in region r and the U.S., i.e. $\Delta P^f = \Delta P_r - \Delta P_{US}$.

For each of the five supermarket mergers in our sample that were consummated, separate tables list the food at home index for the MSA, the food at home index for the U.S., and the change in the MSA's relative food price (the difference between the

percentage changes in these two indices). For four of the five mergers, relative food prices increased at the time of the merger. However, we are reluctant to interpret this evidence as anything more than suggestive that the mergers could have increased food prices because these increases were of the same magnitude as changes in the relative food prices in time periods unaffected by supermarket mergers.

Appendix Table 1: A&P/Waldbaum

Time Period	New York Food Index	U.S. Food Index	Difference Between Change in New York Food Index and Change in U.S. Food Index
Second Half 1984	103.3	103	0.10
First Half 1985	105.2	104.4	0.48
Second Half 1985	105.6	104.2	0.57
First Half 1986	107.5	106	0.07
Second Half 1986*	110.6*	108.5*	0.53*
First Half 1987	114.8	111.5	1.03
Second Half 1987	116.5	112.3	0.76
First Half 1988	120.2	114.6	1.13
Second Half 1989	124.1	118.5	-0.15
First Half 1990	128.8	123	-0.01

* indicates merger announced and consummated in this time period.

Appendix Table 2: Safeway/Vons

Time Period	Los Angeles Food Index	U.S. Food Index	Difference Between Change in Los Angeles Food Index and Change in U.S. Food Index
Second Half 1985	104	104.2	0.00
First Half 1986	106.3	106	0.48
Second Half 1986	107.5	108.5	-1.22
First Half 1987	113.1	111.5	2.44
Second Half 1987*	112.9	112.3	-0.89
First Half 1988	115.7	114.6	0.43
Second Half 1988**	118.2	118.5	-1.24
First Half 1989	123.2	123	0.43
Second Half 1989	124.4	125.4	-0.98
First Half 1990	131.5	131.5	0.84

* indicates merger announced in this time period.
** indicates merger finalized in this time period.

Appendix Table 3: A&P/Big Star

Time Period	Atlanta Food Index	U.S. Food Index	Difference Between Change in Atlanta Food Index and Change in U.S. Food Index
Second Half 1990	131	133.2	-0.13
First Half 1991	131.5	136.6	-2.17
Second Half 1991	129.4	135.1	-0.49
First Half 1992	131.1	136.7	0.13
Second Half 1992	129.3	137	-1.59
First Half 1993*	133.5*	139.6*	1.35*
Second Half 1993	134.3	140.5	-0.05
First Half 1994	135.8	143	-0.66
Second Half 1994	136.5	145.2	-1.02
First Half 1995	142.6	148.3	2.33

* indicates merger announced and consummated in this time period.

Appendix Table 4: Food4Less/Ralphs

Time Period	Los Angeles Food Index	U.S. Food Index	Difference Between Change in Los Angeles Food Index and Change in U.S. Food Index
Second Half 1992	141.6	137	1.14
First Half 1993	145.1	139.6	0.57
Second Half 1993	146.7	140.5	0.46
First Half 1994*	149.5*	143*	0.13*
Second Half 1994**	152.3**	145.2**	0.33**
First Half 1995	157.1	148.3	1.02
Second Half 1995	157.6	149.2	-0.29
First Half 1996	160.4	152.5	-0.43
Second Half 1996	165.3	156.1	0.69
First Half 1997	168.8	157.6	1.16

* indicates merger announced in this time period.
** indicates merger finalized in this time period.

Appendix Table 5: Schwegmann/National Tea

Time Period	New Orleans Food Index	U.S. Food Index	Difference Between Change in New Orleans Food Index and Change in U.S. Food Index
1993	121.2	140.9	-0.16
1994	124.8	144.3	0.56
1995*	131*	148.4*	2.13*
1996	136.4	153.3	0.82

* indicates merger announced and consummated in this time period.

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1. United States v. Von's Grocery Company, 384 U.S. 270 (1966).

2. Federal Trade Commission v. Promodes S.A., 1989-2 Trade Cases, 68,688, Northern District of Georgia.

3. The share price response of supermarkets in markets unaffected by a merger might also rise if the stock market believed that an anticompetitive merger signaled that anticompetitive mergers would occur in other markets.

4. Of course, if investors believed that antitrust authorities would block the anticompetitive elements of an anticompetitive merger, then they would not bid up the price of a rival's stock. Thus, the event study methodology described above might fail to identify some anticompetitive mergers.

5. For those readers who want to compare the event study results with changes in food price indices, Appendix A examines changes in regional food price indices for the five supermarket mergers in our sample that were consummated.

6. A list of the firms in the various indices is available from the authors.

7. In most cases, this estimate is simply the percentage of the firm's stores in the overlap area. For Federated Department Store (Ralphs) and Craig Corporation (Stater Brothers),

the estimate is the percentage of revenue derived from supermarket operations.

8. The Herfindahl-Hirschman Index is the sum of the squared market shares of the firms in the market.

9. Recent 10K reports for Albertsons, Winn Dixie, Weis Markets, and Safeway Stores suggest that supermarkets have profit margins equal to roughly 2 percent of gross revenues. Given this, a 1 percent price increase should increase supermarket profits by 50 percent. In the case of Albertsons', a 50 percent increase in profits at 26 percent of its stores should roughly increase its overall profit by 13 percent. Assuming that the price increase lasted 2 years and assuming a discount rate of 15 percent, the 2 year increase in profit should lead to a 3.5 percent increase in share price.

10. For most of the supermarkets in the data set, overlap equals zero; that is, most observations in the data set do not have operations that overlap with the merging firms.

11. The complete results are available from the authors.

12. Since a supermarket's equity value equals the discounted stream of its profits, an abnormal return of -5 percent corresponds to a 5 percent decline in profit. Assuming that profits equal 2 percent of total revenue (see footnote 16), this 5 percent decline in profit corresponds to a permanent 0.1 percent decline in total revenue. This implies a 0.1 percent decline in retail prices as a first approximation.

Since the equity value of a highly leveraged supermarket would presumably equal a smaller percentage of revenue (e.g., 1 percent), a 5 percent decline in profit for a highly leveraged firm would correspond to a smaller change in retail price (e.g., 0.05 percent).